



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7

11201 Renner Boulevard
Lenexa, Kansas 66219

MAR 10 2014

Dr. Robert Moser
Secretary
Kansas Department of Health and Environment
1000 S.W. Jackson, Suite 540
Topeka, Kansas 66612-1368

Dear Dr. Moser:

RE: Approval of TMDL document for Turkey Creek

This letter responds to the submission from the Kansas Department of Health and Environment, originally received by the U.S. Environmental Protection Agency, Region 7, on September 27, 2013, for a Total Maximum Daily Load document which contained TMDLs for total phosphorus. Turkey Creek was identified on the 2012 Kansas Section 303(d) list as impaired. This submission fulfills the Clean Water Act statutory requirement to develop TMDLs for impairments listed on a state's § 303(d) list. The specific impairments (water body segments and pollutant) are:

<u>Water Body Name</u>	<u>WBID</u>	<u>Pollutant</u>
Turkey Creek	KS-LA-12-533_11	Total Phosphorus
Turkey Creek	KS-LA-12-533_12	Total Phosphorus
Dry Turkey Creek	KS-LA-12-533_13	Total Phosphorus
Bull Creek	KS-LA-12-533_24	Total Phosphorus
Running Turkey Creek	KS-LA-12-533_25	Total Phosphorus

The EPA has completed its review of the TMDL document with supporting documentation and information. By this letter, the EPA approves the submitted TMDLs. Enclosed with this letter is the Region 7 TMDL Decision Document which summarizes the rationale for the EPA's approval of the TMDLs. The EPA believes the separate elements of the TMDLs described in the enclosed document adequately address the pollutant of concern, taking into consideration seasonal variation and a margin of safety.

Although the EPA does not approve the monitoring or implementation plans submitted by the state, the EPA acknowledges the state's efforts. The EPA understands that the state may use the monitoring plan to gauge the effectiveness of the TMDL and determine if future revisions are necessary or appropriate to meet applicable water quality standards. The EPA recognizes that technical guidance and support are critical to determining the feasibility of and achieving the goals outlined in these TMDLs. Therefore, the implementation plan in this TMDL document provides information regarding implementation efforts to achieve the loading reductions identified.

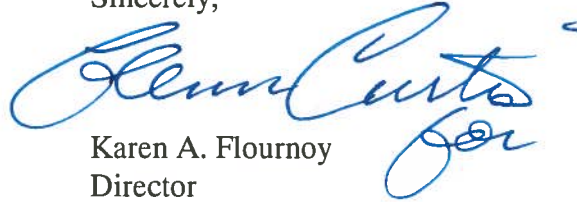


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The EPA is currently in consultation under Section 7 of the Endangered Species Act with the U.S. Fish and Wildlife Service regarding this TMDL document. While we are approving these TMDLs at the present time, we may decide that changes to the TMDL document are warranted based upon the results of the consultation when it is completed.

The EPA appreciates the thoughtful effort that the KDHE has put into these TMDLs. We will continue to cooperate with and assist, as appropriate, in future efforts by the KDHE to develop TMDLs.

Sincerely,



Karen A. Flournoy
Director
Water, Wetlands and Pesticides Division

Enclosure

cc: Mr. John Mitchell, Director, Division of Environment, KDHE

Mr. Tom Stiles, Chief, Watershed Planning, Monitoring and Assessment Section, KDHE



EPA Region 7 TMDL Review

TMDL ID: KS-LA-12-533_11

State: KS

Document Name: TURKEY CREEK

Basin(s): LOWER ARKANSAS BASIN

HUC(s): 11030012

Water body(ies): BULL CR, DRY TURKEY CR, RUNNING TURKEY CR, TURKEY CR

Tributary(ies): BULL CREEK, DRY TURKEY CREEK, RUNNING TURKEY CREEK, TURKEY CREEK (11), TURKEY CREEK (12)

Pollutant(s): BIOLOGICAL INTEGRITY, PERIPHYTON (AUFWUCHS) INDICATOR
BIOASSESSMENTS, PHOSPHORUS, TOTAL

Submittal Date: 9/27/2013

Approved: Yes

Submittal Letter and Total Maximum Daily Load Revisions

The state submittal letter indicates final TMDL(s) for specific pollutant(s) and water(s) were adopted by the state, and submitted to the EPA for approval under Section 303(d) of the Clean Water Act [40 CFR § 130.7(c)(1)]. Include date submitted letter was received by the EPA, date of receipt of any revisions and the date of original approval if submittal is a revised TMDL document.

This TMDL document was submitted by the Kansas Department of Health and Environment as an email attachment on September 27, 2013. After comments from the U. S. Environmental Protection Agency, modified final TMDL documents were submitted as email attachments on November 21, December 16 and 20, 2013, and January 16, 2014.

Water Quality Standards Attainment

The targeted pollutant is validated and identified through assessment and data. The water body's loading capacity for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. The TMDL(s) and associated allocations are set at levels adequate to result in attainment of applicable water quality standards [40 CFR § 130.7(c)(1)]. A statement that the WQS will be attained is made.

There are various influences to the impairment of the Turkey Creek watershed. The first is the effect of the city of McPherson's wastewater on the downstream hydrology and nutrient content. The second is nonpoint sources in proximity to Turkey Creek that contribute direct loadings. The final influence is wet weather sources that dominate loading during runoff events, which includes the wet weather impacts of urban storm water from McPherson and runoff from nonpoint sources in the aftermath of rainfall. During low flow conditions any McPherson wastewater total phosphorus loads decrease as they move downstream. During higher flow conditions total phosphorus concentrations and loads increase at the downstream sampling site from nonpoint source total phosphorus contributions entering the watershed. Higher ortho-phosphorus concentrations also indicate the significant contributions associated with wastewater discharge.

The seasonal flow profile and a strong relationship between total phosphorus and total suspended solids concentrations indicates that nonpoint source pollution resulting from runoff events is the driving factor for elevated total phosphorus concentrations. Phosphorus is typically linked to sediment or total suspended solids because of the propensity of those solids to adsorb phosphorus.

The endpoint of these TMDLs will be to achieve the Kansas water quality standards by eliminating any of the impacts to aquatic life, domestic water supply or recreation associated with excessive phosphorus and objectionable amounts of algae as described in the narrative criteria pertaining to nutrients. There are no existing numeric phosphorus criteria currently in Kansas. The EPA's current suggested benchmarks for stream total

phosphorus in the South-Central Cultivated Great Plains Ecoregion is 0.067 milligrams per liter total phosphorus over the 10 - state aggregate of Level III Ecoregions. A similar total phosphorus benchmark for the Central Great Plains was 0.090 mg/L, spanning from Nebraska to Texas. Turkey Creek resides in the 27d Ecoregion, the Wellington-McPherson Lowlands. Four metrics will serve to establish if the biological community of Turkey Creek reflects recovery, renewed diversity and minimal disruption by the impacts described in the narrative criteria for nutrients on aquatic life, recreation and domestic water supply.

Four Biological Metrics:

1. Macroinvertebrate Biotic Index: A statistical measure that evaluates the effects of nutrients and oxygen demanding substances on macroinvertebrates based on the relative abundance of certain indicator taxa (orders and families): for Kansas, MBI values below 4.5 are indicative of fully supported aquatic life communities.
2. Ephemeroptera, Plecoptera and Trichoptera abundance as a percentage of the total abundance of macroinvertebrates; for Kansas, EPT percentages over 48 percent are indicative of fully supported aquatic life communities.
3. Periphyton density on substrate: The concentration of attached algae (measured by chlorophyll a) over a unit surface area. The referenced suggested range of acceptable conditions lies below a value of 150 milligrams per square meter.
4. Sestonic chlorophyll: The concentration of planktonic algae floating in the water column of the stream. Literature references found that total chlorophyll values over 25 or 30 micrograms per liter and sestonic chlorophyll levels over 8 – 15 µg/L are problematic. A value of 5 µg/L is targeted.

The numeric endpoints for these TMDLs indicating attainment of WQS on Turkey Creek will be:

1. MBI values below 4.5
2. Percentage of individuals comprising the EPT families exceeds 50 percent
3. Periphyton chlorophyll concentrations below 150 mg/sq m.
4. Sestonic chlorophyll concentrations below 5 µg/L.

The endpoints have to initially be maintained over three consecutive years to constitute full support of the designated uses of Turkey Creek. After standards are attained, simultaneous digression of these endpoints more than once every three years, on average, constitutes a resumption of impaired conditions.

In phase one, the first stage will be a reduction of the median total phosphorus concentration at SC533 to 0.348 mg/L, a 50 percent reduction based on the average of the median values of sampling stations within the 27d Ecoregion. The phase one loading capacity for SC533 at the 50 percentile flow condition is 8.92 pounds per day of total phosphorus. If the first phase of reducing phosphorus levels on Turkey Creek improves water quality but does not attain the biological indicators, then a second phase of implementation will commence. Phase two's first stage will direct further reductions in wastewater phosphorus by McPherson, while phase two's second stage would install treatment and practices on the tributaries to Turkey Creek. The second stage will be targeted once the first stage goal is reached. The second stage will be a reduction of the total phosphorus median at SC533 to 0.154 mg/L, a 78 percent reduction, reaching a median equal to that of the best 25 percent of the stations within the 27d Ecoregion. The phase two LC for SC533 at 50 percentile flow condition is 3.95 lb/day total phosphorus.

All four biological measures are numeric endpoints for this TMDL document and will result in the attainment of WQS by eliminating any of the impacts to aquatic life, domestic water supply or recreation associated with excessive phosphorus and objectionable amounts of algae. Achievement of all four of the biological endpoints indicate loads of total phosphorus are within the LC of the stream, WQS are attained and are fully supportive of the designated uses.

Designated Use(s), Applicable Water Quality Standard(s) and Numeric Target(s)

The submittal describes applicable water quality standards, including beneficial uses, applicable numeric and/or narrative criteria, and a numeric target. If the TMDL(s) is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.

While the 2010 KS Surface Water Register is with the EPA for review, the EPA at this time has not acted on this submittal package pending a KDHE response to the EPA's July 10, 2012 letter, requesting additional information and clarification. While the indicated designated uses are not part of the EPA-approved WQS, the EPA recognizes that the state has submitted more stringent restrictions on the water bodies indicated, as is permitted pursuant to Section 510 of the Clean Water Act. The EPA is clarifying the discrepancies between the EPA-approved Register and Kansas's proposed Register within the TMDL decision document.

Designated Uses:

Turkey Creek (11) - expected aquatic life support, primary contact recreation C, groundwater recharge, irrigation and livestock. The designated use pending the EPA action on the 2010 KS Surface Water Register is the addition of food procurement.

Turkey Creek (12) - expected aquatic life support; secondary contact recreation b, food procurement, irrigation and livestock. The designated use pending the EPA action on the 2010 KS Surface Water Register is the removal of food procurement.

Dry Turkey Creek (13) - expected aquatic life support, primary contact recreation B, drinking water supply, food procurement, groundwater recharge, industrial, irrigation and livestock.

Running Turkey Creek (25) - expected aquatic life support, secondary contact recreation b, drinking water supply, groundwater recharge, industrial, irrigation and livestock.

Bull Creek (24) - expected aquatic life support, primary contact recreation C, drinking water supply, groundwater recharge, industrial, irrigation and livestock.

Impaired uses: expected aquatic life, contact recreation and domestic water supply.

Water Quality Criteria:

Nutrients – Narratives: The introduction of plant nutrient into surface waters designated for domestic water supply use shall be controlled to prevent interference with the production of drinking water (K.A.R. 28-16-28e(c)(3)(D)).

The introduction of plant nutrients into streams, lakes or wetlands from artificial sources shall be controlled to prevent the accelerated succession or replacement of aquatic biota or the production of undesirable quantities or kinds of aquatic life (K.A.R. 28-16-28e(c)(2)(A)).

The introduction of plant nutrients into surface waters designated for primary or secondary contact recreational use shall be controlled to prevent the development of objectionable concentrations of algae or algal by-products or nuisance growths of submersed, floating or emergent aquatic vegetation (K.A.R. 28-26-28e(c)(7)(A)).

The phase one loading capacity for SC533 at the 50 percentile flow condition is 8.92 pounds per day of total phosphorus. The phase two LC at the same station and same flow condition is 3.95 lb/day total phosphorus.

Pollutant(s) of Concern

A statement that the relationship is either directly related to a numeric water quality standard, or established using surrogates and translations to a narrative WQS is included. An explanation and analytical basis for expressing the TMDL(s) through surrogate measures, or by translating a narrative water quality standard to a numeric target is provided (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae). For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and a margin of safety that do not exceed the loading capacity. If the submittal is a revised TMDL document, there are refined relationships linking the load to water quality standard attainment. If there is an increase in the TMDL(s), there is a refined relationship specified to validate that increase (either load allocation or wasteload allocation). This section will compare and validate the change in targeted load between the versions.

The state of Kansas does not have a numeric criteria for total phosphorus, but instead has narrative criteria for nutrients. A link has been established between the narrative criteria for nutrients and the numeric total phosphorus target. The EPA's current suggested benchmarks for stream total phosphorus in the South-Central Cultivated Great Plains Ecoregion is 0.067 milligrams per liter total phosphorus over the 10-state aggregate of Level III ecoregions. A similar total phosphorus benchmark for the Central Great Plains was 0.090 mg/L, spanning from Nebraska to Texas. The TMDL target is a direct reduction of the indicated pollutant of concern, total phosphorus. These TMDLs were established in phases and stages to assist in the progressive reduction of total phosphorus loadings and ambient concentrations with periodic assessment of the biological endpoints on the lower reaches of the stream.

Turkey Creek resides largely within Ecoregion 27d, the Wellington-McPherson Lowland area. Low macroinvertebrate biotic index scores are indicative of high quality biological communities. Kansas protocol has been to delineate the boundaries between full and partial aquatic life support and between partial support and

nonsupport for aquatic life as MBI scores of 4.5 and 5.4, respectively. Conditions of full support span phosphorus levels of 0.070 to 0.160 mg/L. Partial support is indicative on streams with phosphorus levels of 0.020 – 0.430 mg/L.

Four targets will be used to determine if the biological community of Turkey Creek meet designated uses as stated in the narrative criteria for nutrients on aquatic life, recreation and water supply. All four targets are measures to determine if the biological community of Turkey Creek reflects recovery and minimal disruption by the impacts described in the narrative criteria for nutrients on aquatic life, recreation and domestic water supply.

The numeric endpoints for these TMDLs indicating attainment of WQS on Turkey Creek will be:

1. MBI values below 4.5,
2. Percentage of individuals comprising the Ephemeroptera, Plecoptera and Trichoptera families exceed 50 percent,
3. Periphyton chlorophyll concentrations below 150 milligrams per square meter and
4. Sestonic chlorophyll concentrations below 5 micrograms per liter.

The narrative criteria of the Kansas water quality standards are based on indications of the current conditions of the prevailing biological community. Excessive primary productivity of algae may be indicated by extreme swings in dissolved oxygen or pH as the chemical reactions of photosynthesis and respiration alter the ambient levels of oxygen or acid-base balance of a stream. Higher pH values tend to occur during higher photosynthesis periods.

If all four numeric endpoints for these TMDLs are met, attainment of Kansas WQS will be met by eliminating impacts to aquatic life, domestic water supply or recreation associated with excessive total phosphorus and objectionable amounts of algae. All endpoints must be maintained over three consecutive years to be considered as fully supportive of designated uses.

Source Analysis

Important assumptions made in developing the TMDL document, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, nonpoint and background sources of pollutants of concern are described, including magnitude and location of the sources. The submittal demonstrates all significant sources have been considered. If this is a revised TMDL document any new sources or removed sources will be specified and explained.

In the absence of a national pollutant discharge elimination system permit, the discharges associated with sources were applied to the load allocation, as opposed to the wasteload allocation for purposes of this TMDL document. The decision to allocate these sources to the LA does not reflect any determination by the EPA as to whether these discharges are, in fact, unpermitted point source discharges within this watershed. In addition, by establishing these TMDL(s) with some sources treated as LAs, the EPA is not determining that these discharges are exempt from NPDES permitting requirements. If sources of the allocated pollutant in this TMDL document are found to be, or become, NPDES-regulated discharges, their loads must be considered as part of the calculated sum of the WLAs in this TMDL document. Any WLA in addition to that allocated here is not available.

There are 13 permitted national pollutant discharge elimination system facilities located upstream of SC533, all are in McPherson County. The permitted facilities are categorized as: three lagoons that are prohibited from discharging, six industrial facilities, one commercial facility, two municipal facilities and one municipal separate storm sewer system permit. The permitted facilities are detailed in Table 5 within the TMDL document. The municipal NPDES permit for the city of McPherson - KS0036196 states that the facility is designed and built to provide for nutrient removal, and total phosphorus should be less than 1.5 milligrams per liter as an annual average. The total phosphorus concentration average for the city of McPherson from 2003 - 2012 has been 1.69 mg/L. The city uses the treated wastewater for irrigation purposes at the city park and a golf course. During drier conditions when irrigation is in use the transport of the total phosphorus load to Dry Turkey Creek may be delayed and significantly reduced. A wastewater holding cell and a retention pond on the golf course adjacent to the treatment facility are used to delay the transport of water to Dry Turkey Creek. When irrigation is not in use and conditions are dry, the discharge from McPherson will account for the majority of the water seen in Dry Turkey Creek below the outfall and retention pond of the plant.

The NCRA facility - KS0000337 discharges only when their disposal wells are down for maintenance. Typically this facility has discharged a few times per year and monitors total phosphorus concentrations on a monthly basis

when discharging. This facility has sampled for total phosphorus 13 times from 2007 through 2010, with an average concentration of 0.55 mg/L.

The city of Galva - KS0022560 is a five-cell lagoon system that does not monitor flow or total phosphorus. The discharge from Galva must travel some distance prior to reaching the upper portions of Turkey Creek. During low flow conditions the discharge originating from Galva reaching the main stem segment leading to SC533 is likely minimal, as Turkey Creek in this area lacks sustainable flow during these conditions.

The city of McPherson's MS4 permit - KSR044013 expired in 2009, but is still in effect until the new permit is issued. The MS4 permit follows a general permit format, requiring six minimum controls to be implemented throughout the permitted areas. The new permits will require the implementation of best management practices to address total phosphorus during the new permit cycle, along with subsequent monitoring to evaluate performance.

The two concrete batch plants - KSG110090 and KSG110092 do not have any discharges on record. The BPU Water Treatment Air Stripping Unit - KS0088625 has a design flow of 4.03 million gallons per day but typically does not discharge. This facility is a public water supply treatment facility designed to remove volatile organic chemicals from groundwater prior to placement in the city of McPherson's potable water system. This facility does not monitor total phosphorus.

The following industrial facilities have minimal or no potential to contribute to the total phosphorus impairment in the watershed: the BPU Power plant #3 facility - KS0093602 has a wastewater detention pond with no reported discharge; the BPU McPherson #2 facility - KS0079758 is used for emergency use during peak operations and there is no reported discharge; the Hospira, Inc. facility - KS0092517 typically discharges to the sanitary sewer and has not reported any discharge and the permit has not been renewed.

The non-discharging facilities, which include Sunflower School - KSJ000211, Krehbiel Specialty Meats - KSJ000103 and the Johns Manville Corporation - KSJ000503, are not contributing to the total phosphorus impairment in the watershed since they do not discharge.

There are 17 certified or permitted concentrated animal feeding operations within the Turkey Creek watershed, see Appendix A within the TMDL document. All of these livestock facilities have waste management systems designed to minimize runoff entering their operation and detain runoff emanating from their facilities. These facilities are designed to retain a 25-year, 24-hour rainfall/runoff event as well as an anticipated two weeks of normal wastewater from their operations. Typically, this rainfall event coincides with stream flow that occurs less than 1 - 5 percent of the time. It is unlikely total phosphorus loading would be attributable to properly operating permitted facilities, though extensive loading may occur if any of these facilities were in violation and discharged.

Though the total potential number of animals is approximately 20,200 head in the watershed, the actual number of animals at the feedlot operations is typically less than the allowable permitted number. There are 1,142 farms with 566,309 acres of farmland and 55,000 head of cattle in McPherson County, and 829 farms with 338,598 acres of farmland and 24,000 head of cattle in Harvey County.

Permitted CAFOs identified in this TMDL document are part of the assigned wasteload allocation. Animal feeding operations and unpermitted CAFOs are considered under the load allocation because there is currently not enough detailed information to know whether these facilities are required to obtain NPDES permits. This TMDL document does not reflect a determination by the EPA that such facility does not meet the definition of a CAFO nor that the facility does not need to obtain a permit. To the contrary, a CAFO that discharges or proposes to discharge has a duty to obtain a permit. If it is determined that any such operation is a CAFO that discharges, any future WLA assigned to the facility must not result in an exceedance of the sum of the WLAs in this TMDL document as approved.

Any CAFO that does not obtain an NPDES permit must operate as a no discharge facility. Any discharge from an unpermitted CAFO is a violation of Section 301. It is the EPA's position that all CAFOs should obtain an NPDES permit because it provides clarity of compliance requirements, authorization to discharge when the discharges are the result of large precipitation events such as in excess of 25-year and 24-hour frequency/duration or are from a man-made conveyance.

The watershed has 15,927 people. There are approximately 14,025 people residing within the cities of McPherson and Galva in the watershed. Households outside of the municipalities that operate wastewater treatment facilities are presumably using on-site septic systems. Based on the populations of McPherson and Galva relative to the watershed population, there are an estimated 1,902 people being served by on-site waste

systems in the watershed. The Spreadsheet Tool for Estimating Pollutant Load was used to identify the number of septic systems within the 12 digit Hydrological Unit Code within the watershed. According to STEPL, there are approximately 976 septic systems within the Turkey Creek watershed with an anticipated failure rate of 0.93 percent. Since 88 percent of the population within the watershed reside in McPherson and Galva and are served by wastewater treatment facilities, failing on-site septic systems do not likely contribute to the total phosphorus impairment within the Turkey Creek watershed.

Land use within the Turkey Creek watershed is dominated by cropland at 76.3 percent. Grassland and developed areas comprise about 11.2 and 9.8 percent of the watershed, respectively. Forest, wetlands and open water comprise 1.8, 0.6 and 0.3 percent, respectively. About 84 percent of the Turkey Creek watershed has a permeability value less than 1.14 inches per hour, which contributes to runoff during very low rainfall intensity events. As the watersheds' soil profiles become saturated, excess overland flow is produced. The majority of the nonpoint source nutrient runoff will be associated with cropland areas throughout the watershed that are in close proximity to the stream corridors. Runoff from the cropland and developed areas could contribute significant sources of total phosphorus loading.

Phosphorus is present over the landscape, in the soil profile and in terrestrial and aquatic biota. Wildlife can contribute phosphorus loadings, particularly if they congregate to a density that exceeds the assimilative capacity of the land or water.

All known sources of total phosphorus for the Turkey Creek watershed have been listed and considered.

Allocation - Loading Capacity

The submittal identifies appropriate loading capacities, wasteload allocations for point sources and load allocations for nonpoint sources. If no point sources are present, the WLA is stated as zero. If no nonpoint sources are present, the LA is stated as zero [40 CFR § 130.2(i)]. If this is a revised TMDL document the change in loading capacity will be documented in this section. All TMDLs must give a daily number. Establishing TMDL "daily" loads consistent with the U.S. Court of Appeals for the D.C. circuit decision in Friends of the Earth, Inc. v. EPA, et al., No. 05-5015, (April 25, 2006).

This TMDL will be established in phases and stages to progressively reduce phosphorus loadings and ambient concentrations with periodic assessment of the biological endpoints on the lower reaches of Turkey Creek. The initial phase will entail reductions in phosphorus levels of the McPherson wastewater that should translate to median concentrations approaching the median total phosphorus concentration for Ecoregion 27d. Total phosphorus load reductions will occur throughout the stream and be monitored at SC533. Riparian management in areas adjacent to cropland and livestock management in the vicinity of streams within the watershed should reduce nonpoint source loads under conditions of moderate flows as part of stage two. The phase one target is a median total phosphorus concentration of 0.348 milligrams per liter, periphyton less than 150 milligrams per meter squared and sestonic chlorophyll less than 5 micrograms per liter. Once the concentrations at SC533 approach the phase one target, an intensive assessment of macroinvertebrate diversity will be made to determine compliance with the narrative nutrient criteria.

If one or more of the biologic endpoints are not met at the end of phase one, phase two will commence. Additional reductions in loads and phosphorus concentrations will be accomplished through enhanced implementation of controls on point and nonpoint sources. The desired target levels are comparable to the median concentrations seen on the best streams in Ecoregion 27d. McPherson wastewater will undergo enhanced nutrient removal and the management of riparian activities will be extended to urban storm water contributing areas and along tributaries adjacent to cropland throughout the watershed. A second intensive biological assessment will be made once phosphorus levels approach that seen at the regional benchmark of 0.154 mg/L of total phosphorus.

The phase one loading capacity for SC533 at the 50 percentile flow condition is 8.92 pounds per day of total phosphorus. The phase two LC at the same station and same flow condition is 3.95 lb/day. Allocations for all flow conditions assigned to the Turkey Creek watershed are illustrated in Table 9 within the TMDL document.

Wasteload Allocation Comment

The submittal lists individual wasteload allocations for each identified point source [40 CFR § 130.2(h)]. If a WLA is not assigned it must be shown that the discharge does not cause or contribute to a water quality standard excursion, the source is contained in a general permit addressed by the TMDL, or extenuating circumstances exist which prevent assignment of individual WLA. Any such exceptions must be explained to a satisfactory degree. If a WLA of zero is assigned to any facility it must be stated as such [40 CFR § 130.2(i)]. If this is a revised TMDL document, any differences between the original TMDL(s) WLA and the revised WLA will be

documented in this section.

The TMDLs and allocations for all flow conditions assigned to the Turkey Creek watershed are illustrated in Table 9 within the TMDL document. The total phosphorus wasteload allocation at the 50 percent flow condition for phase one and phase two is 7.76 pounds per day and 3.44 lb/day, respectively. The total phosphorus municipal separate storm sewer systems WLA at the 50 percent flow condition for phase one and phase two are 0.29 lb/day and 0.13 lb/day, respectively.

The total phosphorus WLA per facility is 25.06 lb/day for McPherson's wastewater treatment plan, 0.97 lb/day for Galva and 0.54 lb/day for NCRA Refinery.

Load Allocation Comment

All nonpoint source loads, natural background and potential for future growth are included. If no nonpoint sources are identified, the load allocation must be given as zero [40 CFR § 130.2(g)]. If this is a revised TMDL document, any differences between the original TMDL(s) LA and the revised LA will be documented in this section.

The TMDLs and allocations for all flow conditions assigned to the Turkey Creek watershed are illustrated in Table 9 within the TMDL document. The total phosphorus load allocation at the 50 percent flow condition for phase one and phase two is 0.87 pounds per day and 0.38 lb/day, respectively. Nonpoint sources are assumed to be very minimal at times during low flow conditions when Turkey Creek's flow is composed strictly of McPherson wastewater. The LA grows proportionately as normal conditions occur.

Margin of Safety

The submittal describes explicit and/or implicit margins of safety for each pollutant [40 CFR § 130.7(c)(1)]. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided. If this is a revised TMDL document, any differences in the MOS will be documented in this section.

The margin of safety provides some hedge against the uncertainty in phosphorus loading into Turkey Creek, predominantly from the point source dischargers in the watershed. This TMDL document uses an implicit MOS relying on conservative assumptions to be assured that future wasteload allocations will not cause further excursion. Design flows are used for the two municipal wastewater discharge facilities to set WLAs. Demographic trends indicate McPherson and Galva are likely to decline in population. Biological endpoints are used to assess the narrative criteria and have to be maintained for three consecutive years before attainment of water quality standards can be claimed. There is often a synergistic effect of phosphorus and nitrogen on instream biological activity. Concurrent efforts by McPherson to reduce the nitrogen content of its wastewater should compliment the effect of phosphorus load reduction in improving the biological condition of Turkey Creek.

Seasonal Variation and Critical Conditions

The submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s) [40 CFR § 130.7(c)(1)]. Critical conditions are factors such as flow or temperature which may lead to the excursion of the WQS. If this is a revised TMDL document, any differences in conditions will be documented in this section.

A three season approach was used: the spring season consisting of the months of April, May and June; the summer - fall season consisting of the months of July, August, September and October and the winter season that includes January, February, March, November and December. The highest average total phosphorus concentrations are observed during the low flow condition in the spring season and the lowest average total phosphorus concentrations are observed during the high flow condition in the winter. The higher total phosphorus concentrations during the low flow condition are indicative of wastewater loading, which in this case is a result of total phosphorus loading from the city of McPherson's wastewater treatment plant.

Higher total phosphorus concentrations within the Running Turkey Creek subwatershed occur during the months of April, May, June and July. The seasonal flow profile indicates that nonpoint source pollution resulting from runoff events is the driving factor for the elevated total phosphorus concentrations. A strong relationship is indicated between total phosphorus and total suspended solids concentrations within Running Turkey Creek, reflective of nonpoint source loading within this subwatershed.

These TMDLs also apply across all flow conditions including high flow events when increased nutrient loading is likely to occur.

Public Participation

The submittal describes required public notice and public comment opportunities, and explains how the public comments were considered in the final TMDL(s) [40 CFR § 130.7(c)(1)(ii)].

An active internet website was established at <http://www.kdheks.gov/tmdl/index.htm> to convey information to the public on the general establishment of TMDLs and specific TMDLs for the Lower Arkansas Basin. A public hearing on this TMDL document was held on September 4, 2013, in Newton to receive public comments. No comments were received regarding this TMDL document. The Lower Arkansas River Basin Advisory Committee met to discuss the TMDLs in the basin on May 31, 2012, in Hutchinson, September 12, 2012, in Halstead, KS and on April 3, 2013, in Hutchinson.

Monitoring Plan for TMDL(s) Under a Phased Approach

The TMDL identifies a monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of water quality standards, and a schedule for considering revisions to the TMDL(s) (where a phased approach is used) [40 CFR § 130.7]. If this is a revised TMDL document, monitoring to support the revision will be documented in this section. Although the EPA does not approve the monitoring plan submitted by the state, the EPA acknowledges the state's efforts. The EPA understands that the state may use the monitoring plan to gauge the effectiveness of the TMDLs and determine if future revisions are necessary or appropriate to meet applicable water quality standards.

The KDHE rotational station SC533 on Turkey Creek was sampled bimonthly or quarterly during the sampling years of: 1990, 1994, 1998, 2002, 2006 and 2010. Supplementing the routine sampling, the Little Arkansas watershed restoration and protection strategy group sampled two locations within the Turkey Creek watershed from 2008 - 2010. This sampling was conducted by Kansas State University. The U.S. Geological Survey sampled Turkey Creek near Buhler and Dry Turkey Creek in 2007 and 2008.

Under the current version of the continuing planning process, the next anticipated revision would come in 2013, which will emphasize implementation of watershed restoration and protection strategy activities. Incorporation of this TMDL document will be made into the WRAPS. Recommendations of this TMDL document will be considered in the Kansas Water Plan implementation decisions under the State Water Planning Process for fiscal years 2013 - 2021.

Future stream sampling will occur bimonthly at SC533 every fourth year, with 2014 being the next scheduled sampling year. The monitoring will include the initiation of sestonic chlorophyll sampling. Monitoring of tributary levels of total phosphorus during runoff events will help direct abatement efforts toward major nonpoint sources. Monitoring of total phosphorus below the McPherson outfall in Dry Turkey Creek will help assess improvements in their nutrient removal processes. Monitoring of total phosphorus should be a condition of the municipal separate storm sewer system permits within the watershed.

In 2015, macroinvertebrate and periphyton sampling will occur at accessible locations on Dry Turkey Creek and Turkey Creek. The stream will be evaluated for possible delisting, after phase one implementation in 2022. In 2016, an evaluation will be made as to the degree of implementation that occurred within the watershed. The next cycle of 303(d) activities in the Lower Arkansas Basin will be in 2016. At that point in time, phosphorus data from SC533 should show indications of declining concentrations relative to the pre-2011 data, particularly at baseflow conditions. By 2016, the city of McPherson should be implementing the appropriate measures to decrease the phosphorus content of its wastewaters.

Decisions will be made through the Little Arkansas River regarding the implementation approach and follow up of additional implementation in the watershed. If the biological endpoints are achieved over the years of 2018 - 2021, the conditions described by the narrative nutrient criteria will be viewed as attained and Turkey Creek will be moved to Category 2 on the 2022 303(d) list. If they are not, phase two of this TMDL document begins in 2022. Should modifications be made to the applicable water quality criteria during the ten-year implementation period, consideration for delisting, desired endpoints of this TMDL document and implementation activities may be adjusted accordingly.

Once the water quality standards are attained, the adjusted ambient phosphorus concentrations on Turkey Creek will be the basis for establishing numeric phosphorus criteria through the triennial water quality standards process to protect the restored biological and chemical integrity of Turkey Creek.

Reasonable Assurance

Reasonable assurance only applies when less stringent wasteload allocation are assigned based on the

assumption that nonpoint source reductions in the load allocation will be met [40 CFR § 130.2(i)]. This section can also contain statements made by the state concerning the state's authority to control pollutant loads. States are not required under Section 303(d) of the Clean Water Act to develop TMDL implementation plans and the EPA does not approve or disapprove them. However, this TMDL document provides information regarding how point and nonpoint sources can or should be controlled to ensure implementation efforts achieve the loading reductions identified in this TMDL document. The EPA recognizes that technical guidance and support are critical to determining the feasibility of and achieving the goals outlined in this TMDL document. Therefore, the discussion of reduction efforts relating to point and nonpoint sources can be found in the implementation section of the TMDL document, and are briefly described below.

The states have the authority to issue and enforce state operating permits. Inclusion of effluent limits into a state operating permit and requiring that effluent and instream monitoring be reported to the state should provide reasonable assurance that instream water quality standards will be met. Section 301(b)(1)(C) requires that point source permits have effluent limits as stringent as necessary to meet WQS. However, for wasteload allocations to serve that purpose, they must themselves be stringent enough so that (in conjunction with the water body's other loadings) they meet WQS. This generally occurs when the TMDL(s)' combined nonpoint source load allocations and point source WLAs do not exceed the WQS-based loading capacity and there is reasonable assurance that the TMDL(s)' allocations can be achieved. Discussion of reduction efforts relating to nonpoint sources can be found in the implementation section of the TMDL document.

The State Water Plan annually generates \$16 - 18 million and is the primary funding mechanism for implementing water quality protection and pollution reduction activities in the state through the Kansas Water Plan. The state water planning process coordinates and directs programs and funding toward watershed and water resources of the highest priority. The state allocates at least 50 percent of the fund to programs supporting water quality protection. This watershed and its TMDL document are located within a high priority watershed restoration and protection strategy area and should receive support for pollution abatement practices that lower the loading of sediment and nutrients. Due to the need to reduce the high nutrient loads in the Turkey Creek watershed, which contributes to further impairments on the Little Arkansas River, this TMDL will be High Priority for implementation.

A primary participant for implementation will be the city of McPherson wastewater and storm water programs. Other primary participants will be agricultural and livestock producers that are operating immediately adjacent to Turkey Creek and tributaries within the priority sub-watersheds. Watershed coordinators and technical staff of the WRAPS, along with Conservation District personnel and county extension agents should assess possible sources adjacent to Turkey Creek, Running Turkey Creek and Dry Turkey Creek below McPherson during 2013. Implementation activities to address nonpoint sources should focus on those areas with the greatest potential to impact nutrient concentrations adjacent to these streams.

The Little Arkansas WRAPS 9-Element plan will be reviewed every 5 years starting in 2016. The timeframe of this document for best management practice implementation of the sediment and phosphorus TMDLs is 40 years. The WRAPS will examine BMP placement and implementation in 2016 and every subsequent 5 years through 2051. Sub-watershed total reduction milestones for nutrient BMP implementation in the 9-element plan calls for 52,703 pounds of total phosphorus reductions through cropland BMPs and 38,199 lbs of total phosphorus reductions through livestock BMPs, totaling 90,902 lbs in phosphorus reduction in the Turkey Creek watershed. The Little Arkansas WRAPS 9-element plan implementation schedule is based on a 40-year plan, however, if practices are implemented as documented, it will only take 22 years to meet the endpoint.

Phase one priority is focused on wastewater treatment at McPherson and riparian management along the lower reaches to effectively reduce the phosphorus loading to the stream. Phase two priorities will expand nonpoint source abatement along Dry Turkey Creek, Running Turkey Creek and Turkey Creek, and include further reductions in wastewater phosphorus loads at McPherson.

Use of biological nutrient removal technology has been well established to reduce nutrient levels in wastewater, including phosphorus. Nutrient control has been proven effective through conservation tillage, contour farming and use of grass waterways and buffer strips. The proper implementation of comprehensive livestock waste management plans has proven effective at reducing nutrient runoff associated with livestock facilities.

Reduction strategies for McPherson wastewater should be evaluated by mid-2014 with subsequent planning, design and construction of any necessary enhanced treatment completed within the next permit cycle after 2017. In 2013, urban storm water and rural runoff management should commence in McPherson. Pollutant reduction practices should be installed within the priority sub-watersheds before 2015, with follow-up implementation,

including other sub-watersheds throughout 2016 - 2020. If biological conditions warrant, Phase Two will begin in 2022 and continue through 2032.

This watershed lies within the Little Arkansas Subbasin (8 digit Hydrological Unit Code: 11030012), which is among the top sixteen HUC8s targeted for state action to reduce nutrients. This TMDL document is initially driven by implementation of point source treatment improvements. Priority HUC12s in the watershed can be identified based on the cropland areas adjacent to the streams within the watershed. There are four priority HUC12s with the majority of the land use as cropland that also are adjacent to Running Turkey Creek, Turkey Creek and Dry Turkey Creek within the watershed. The four priority HUC12s are: 110300120205, 110300120206, 110300120207 and 110300120208. Nonpoint source reduction efforts within these priority areas should be further prioritized based on the riparian corridors adjacent to the cropland or any livestock facilities. These priority HUC12s are additionally identified in the approved 9-element WRAPS plan within the Little Arkansas WRAPS critical targeted areas for nutrients. In addition to the aforementioned HUC12s, the WRAPS is also targeting 110300120204.